

Taking ART to Scale: Determinants of the Cost and Cost-Effectiveness of Antiretroviral Therapy in 45 Clinical Sites in Zambia

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CIDRZ ART PROGRAM: SUMMARY COST AND OUTCOMES

APRIL 26, 2004 - JULY 1, 2008

- ▶ Person-years of ART provided: 125,436
- ▶ Average person-years of ART per site: 886
- ▶ Average person-years of ART per patient: 1.39

- ▶ Total expenditures: \$69,701,000
- ▶ Ave. cost per ART-year per site: \$638
- ▶ Cost per ART-Year: \$556

- ▶ Lives saved per 100 PY: 33.3
- ▶ DALYS averted per 100 PY: 244.7

METHODS

Costs: \$ per PY of ART:

- ▶ Micro-costing
- ▶ Excluded HIV test and pre-ART monitoring
- ▶ ARVs : per prescriptions x tabs per prescription x cost per tab
- ▶ Personnel on site per CIDRZ salary support data base
- ▶ Included off-site support including expatriate personnel
- ▶ Ancillary activities such as training; IT support; community outreach.

Outcomes: \$ per death averted and per DALY averted

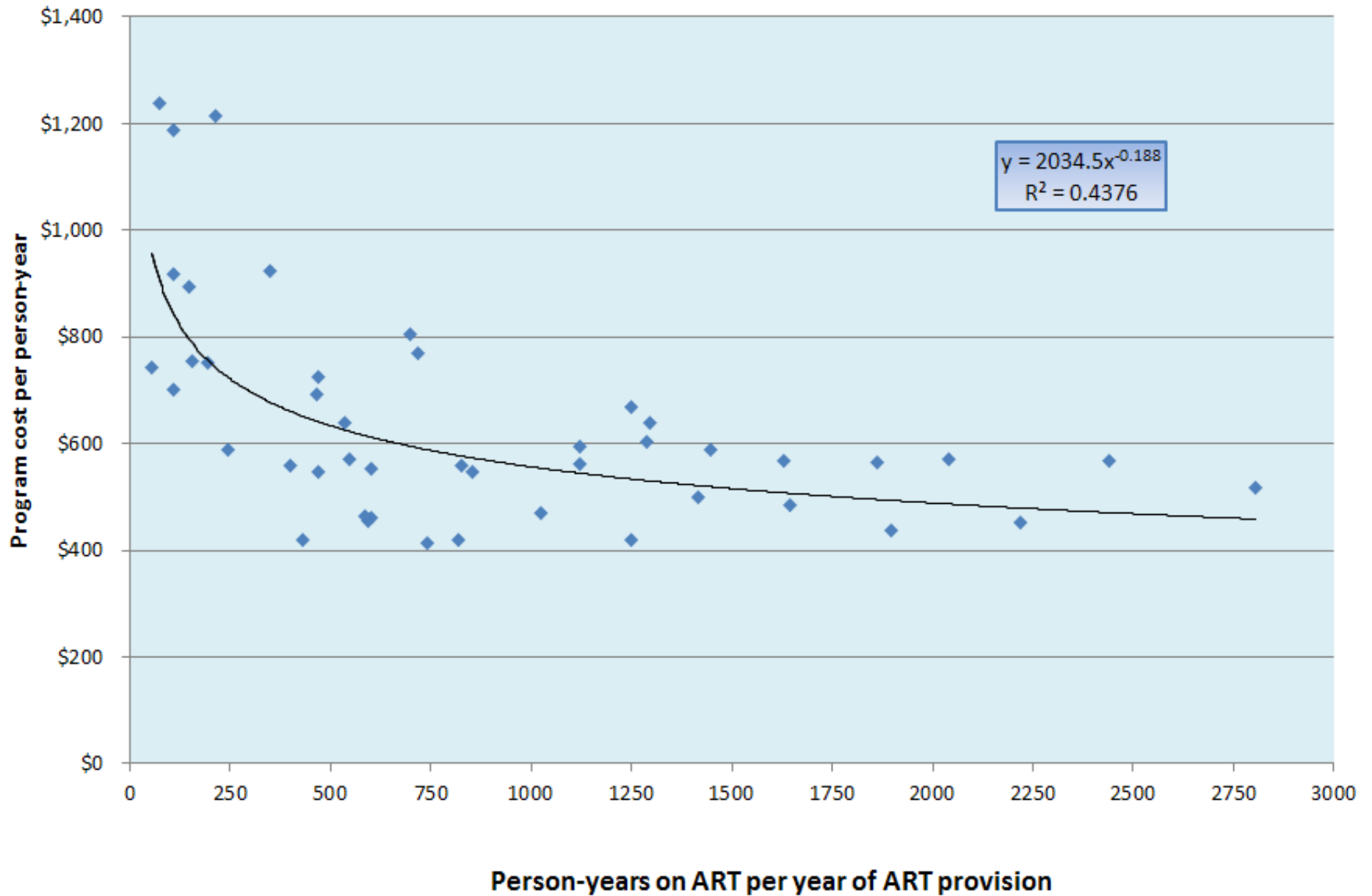
- ▶ Site-specific comparison of observed deaths per PY with Uganda control group.
- ▶ Standard DALYs averted per death averted
- ▶ Results presented for empirical period only and projected 10 years

SELECTED EPIDEMIC INPUTS

	Totals: all sites	Range across 45 sites
		50th Percentile (Inter-Quartile Range)
Percent female	59.9%	60.4% (58.6% - 62.0%)
Percent adults	93.8%	93.6% (92.6% - 95.7%)
CTX status	60.7%	52.1% (45.9% - 81.6%)
Percent with WHO stage 4	11.7%	10.5% (8.2% - 15.2%)
Deaths per 100 PY in CIDRZ (45 sites)		
Baseline CD4: 000 - 050	4.6	4.2 (1.5 - 6.6)
Baseline CD4: 050 - 199	2.9	2.7 (0.7 - 3.7)
Baseline CD4: 200 +	2.4	2.4 (0.0 - 3.4)
Deaths per 100 PY in HBAC comparison group		
Baseline CD4: 000 - 050	116	NA
Baseline CD4: 050 - 199	27	
Baseline CD4: 200 +	7	
Rate of annual switch from first to second-line ARV regimen		
Year 1	0.8%	NA
Year 2	1.1%	
Year 3	2.1%	
Year 4	3.0%	
Year 5	3.4%	
Discounted DALYS averted per death averted	7.3	NA

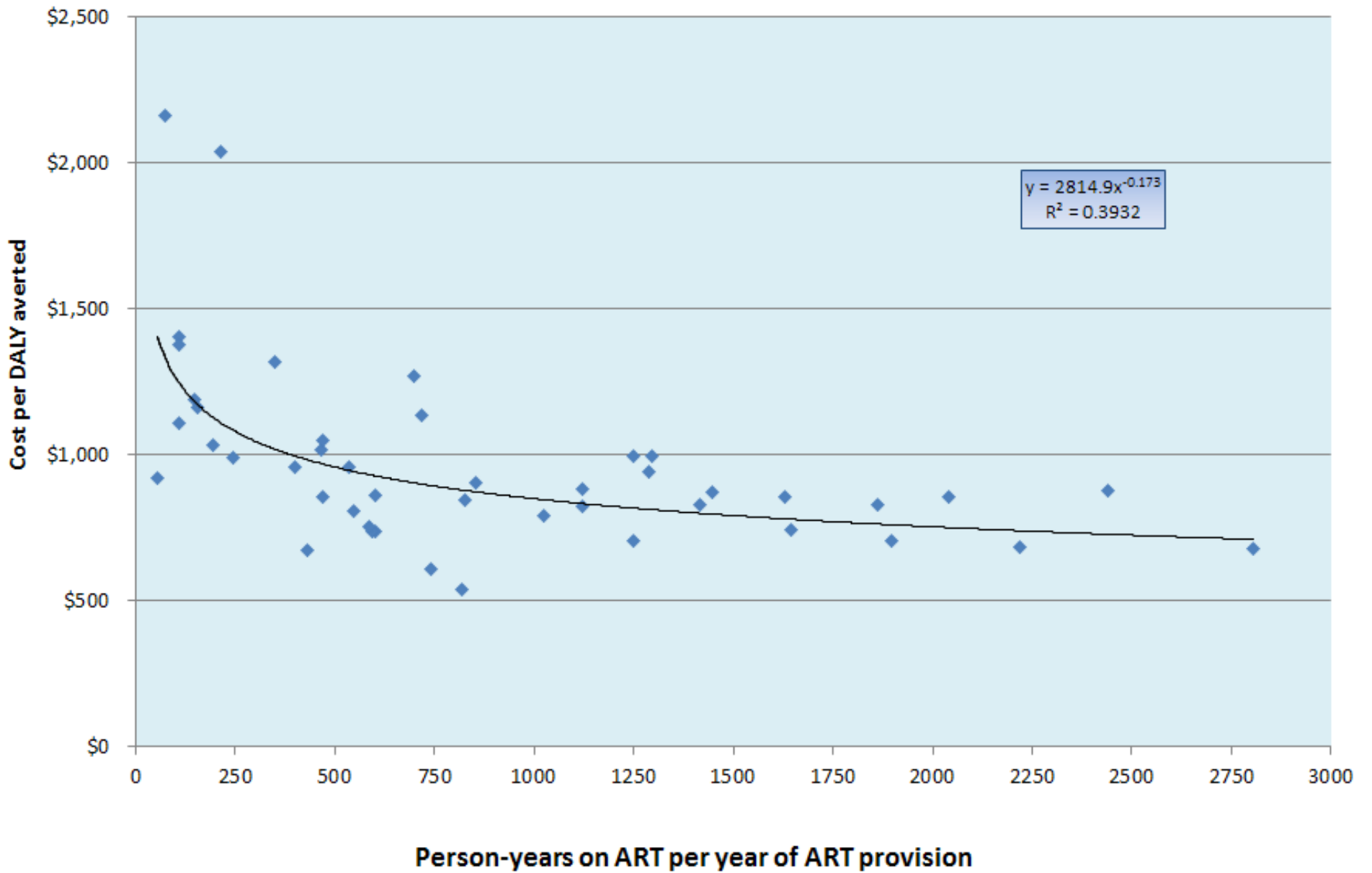
CIDRZ ART Program

Economies of Scale - Unit Costs (n=45)



CIDRZ ART Program

Economies of Scale - Cost-effectiveness (n=45)



CIDRZ Zambia ART program cost-effectiveness in 45 sites

	Costs per DALY Averted (Mean and standard deviation)		Cost per death averted (Mean and standard deviation)	
	Benefits calculated after 16 weeks of ART	Benefits calculated from start of ART	Benefits calculated after 16 weeks of ART	Benefits calculated from start of ART
Cost of future ART assuming future costs per PY based on observed variation in costs by site.	\$833 (\$316)	\$1,065 (\$678)	\$6,118 (\$2,323)	\$7,822 (\$4,985)
Cost of future ART assuming future costs per PY are the same as the current pooled average for all sites	\$898 (\$160)	\$1,149 (\$496)	\$6,601 (\$1,179)	\$8,440 (\$3,646)
No projection of future costs or benefits; results confined to empirical data	\$1,210 (\$2,262)	\$1,550 (\$3,935)	\$1,668 (\$590)	\$2,133 (\$1,172)

Zambia per-capita GDP (2010): \$1,500 PPP or \$500 (US\$)

Thus CE or highly CE by WHO criteria

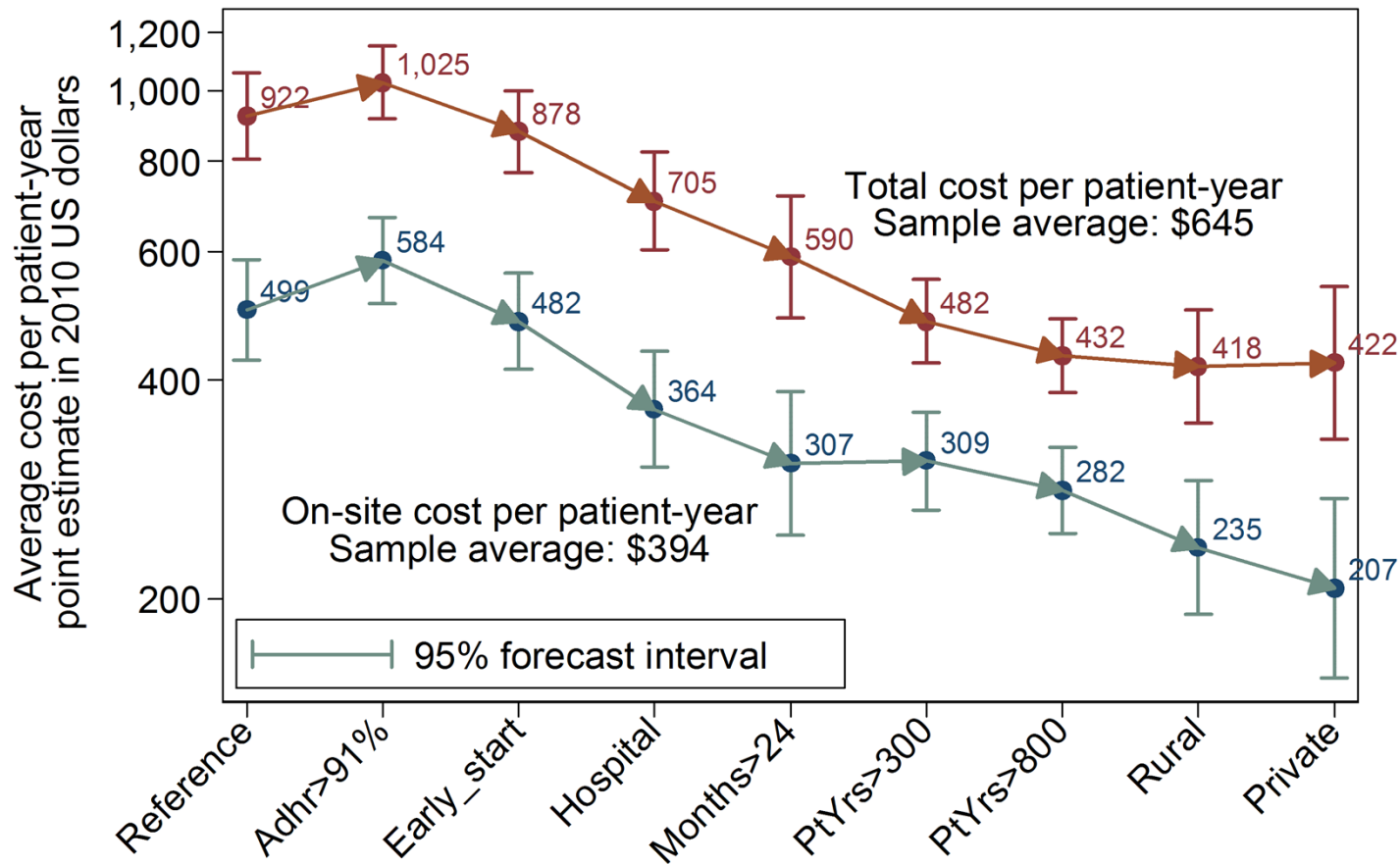
SENSITIVITY ANALYSES: \$ PER DALY AVERTED

Model input	Cost per DALY averted		
	Base case value	50% of base case value	150% of base case value
Discounted DALYS averted per death averted	7.3	\$1,686	\$562
Deaths per 100 PY in HBAC comparison group			
Baseline CD4: 000 - 050	116	\$1,113	\$763
Baseline CD4: 050 - 199	27		
Baseline CD4: 200 +	7		
Weighted ave. cost of 2nd-line ARV regimen	\$897	\$690	\$997
Weighted ave. cost of 1st-line ARV regimen	\$259	\$784	\$902
Discount rate	3.0%	\$896	\$796
Ave. regimen switch rate (5 years of observation) ¹	2.2%	\$810	\$872

1. See Table 1 for switch rate per year per successive year of treatment.

**Monte Carlo 20,000 trials, ICER \$570 - \$1,357
at the 95% confidence level.**

ESTIMATED TOTAL AND ON-SITE COST PER PATIENT YEAR BY CHARACTERISTIC OF THE ART FACILITY



"Reference" facility is an urban public sector clinic, with less than 91% adherence less than 2 years experience, fewer than 300 patients and late starting patients. Estimated effects of facility characteristics accumulate from left to right

Source: Computations from semilog models in Table 6 , N = 45

LIMITATIONS

- No assessment of change in unit costs over time. Therefore, given findings of Menzies 2011, may over-estimate long-term costs.
- Use of Ugandan cohort as historical control.
- No assessment of pre-ART costs.

CONCLUSIONS – IMPLICATIONS:

1. ART programs can be significantly less costly when they:
 - Exploit economies of scale
 - Initiate patients at higher CD4 counts.
 - Locate in hospitals rather than clinics
2. Two-thirds of all costs are consumed on-site.
3. Rural location, private sector are associated with shifting cost from on- to off-site. Thus, some policies that would reduce on-site costs, such as out-sourcing to private providers or locating facilities in rural areas, would need off-setting increases in central support.